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COMPUTER ASSOCIATION LTD (INCORPORATING AMUS AND SPARC)

ATOMIC RADIATION IN THE HOME

by

Peter R Jensen VK2AQJ / G4GZT

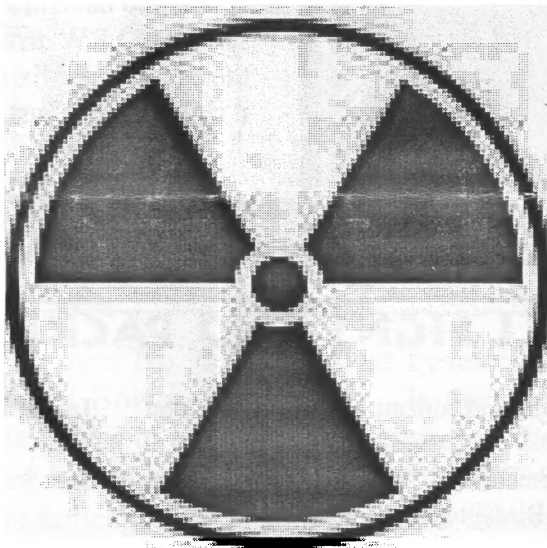
At a recent ACCA meeting, the subject of ionizing radiation came up in the context of Geiger Counters. In this regard, John Innes noted that he had acquired a Geiger Counter module that that can be attached to a laptop computer. The author referred to a self contained Geiger Counter that he has owned for many years. These devices are likely to be available for inspection at a future ACCA meeting. For this reason, this article has been prepared for Microcom readers based on material published in Electronics Australia some years ago.

Over a number of years and related to power lines carrying high voltage AC current, there have been concerns among some sectors of the Public, regarding the possible danger to health of low level electromagnetic radiation. This is the type of energy produced by electricity as found in the ordinary house mains and is generally known as non-ionizing radiation. This concern was well ventilated in a case in the Land and Environment Court of New South Wales, concerning high tension electricity lines running to the west of the Blue Mountains. Not long after that, a Commission of Enquiry was held to determine the health implications of such non-ionizing radiation, with largely inconclusive results.

Given this level of public anxiety, and given the rather tenuous evidence of danger to health associated with non-ionizing radiation, it is rather surprising that the well documented as dangerous ionizing radiation produced by radioactive substances, has received so little attention in recent times.

REDISCOVERING RADIOACTIVITY

In South Australia during the latter part of the 1950's and into the 1960's, a considerable amount of electronic equipment was released onto the surplus market by the Government. This came out of the experimental work that had been conducted to monitor atomic weapons testing at Woomera by the British.



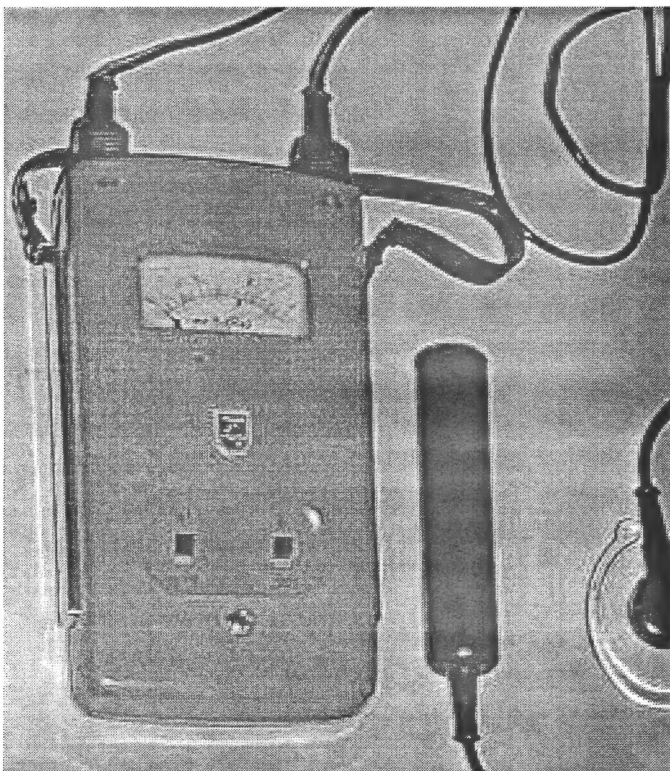
At this stage, while not a licensed radio amateur, I was still intensely interested in most things to do with electronics. One day I was browsing through the collection of disposals equipment at a once famous South Australian secondhand dealer, Canns, in the Norwood Parade, and came across a small grey

coloured instrument. This turned out to be a Geiger Counter made by Philips and, as it was an inexpensive purchase, I handed over my money and took it away.

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GEIGER COUNTER BY PHILIPS

EDITORIAL

TheACCA Company Secretary and Principal Editor, Mayling, is on her annual pilgrimage to the Old Dart, together with ACCA stalwart, Sam. Lucky persons both. Your humble President has therefore stepped into the Editorial chair where usually his role is sometime scribe and text editor of last resort.

So this month, not only do you get Microcom filled with PRJ material but you get his editing efforts too. Fortunately, John Innes has stepped up to the mark and produced a piece on the modern version of the Geiger Counter linked to a Laptop PC. It makes an interesting counterpoint to the Philips device illustrated across, which must be at least 50 years old but is still operational using OC 75 transistors. One wonders how well modern devices will do with their tiny components and skinny tracks all susceptible to Sydney's damp salty atmosphere.

The original Osborne owned by "Y H" Editor died prematurely because of corrosion on the contacts between the diskette drive cabling and the mother board. Other PCs seem to have lasted better, perhaps because they run "warm" and have a fan to suck the air through and around components.

By contrast with such mechanical and, physical problems, the world of software angst seems to multiply endlessly. This month a long delayed "Defrag" of the E-mail and Communications desktop machine, appears to have killed something that allows Nero to see the CD RW drive. A long and frustrating hunt for the cause and a fix still continues. Forest Gump had it right: Life is just like a box of chocolates, etc.

See you at the AGM - Attendance at the July meeting is shown on page 12! Sic Transit Gloria Mundi!

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At the time there was really no good reason to own a Geiger Counter, although forty years ago, no doubt everyone was a good deal more worried about radioactivity than they seem to be nowadays. Remarkable to relate, this device was found to be operational and was quite sensitive enough to pick up background radiation as the odd cosmic ray penetrated its Geiger-Muller tube. It was provided with two such tubes, one mounted internally and the other as an external probe on the end of a cable, the two being internally selectable via a slide switch.

Along with a number of other electronic items, this device crossed the Hay Plains to Sydney in 1965. Since that time it has lain in a drawer together with other electronic instruments in the author's collection: Together with the author, it steadily deteriorated with time. Perhaps twenty years ago, it was noted as appearing to be no longer functional. However with no immediate reason to check radiation levels, it stayed in that condition until quite recently. Sic Transit Gloria Woomera!

Some time ago a request was received from one of the author's colleagues who was aware of the writer's interest in electronic equipment of

all sorts and his radio amateur licence. No doubt he was also aware of the writer's Bower Bird habits. The substance of request was to enquire whether the author possessed or had access to, a Geiger Counter in order that the colleague might examine his favourite brand of synthetic coffee which was made in Poland. This request was of course based on the knowledge that, during some time in the preceding years, Poland has been liberally covered with the radioactive fallout products from the Chernobyl disaster. My col-

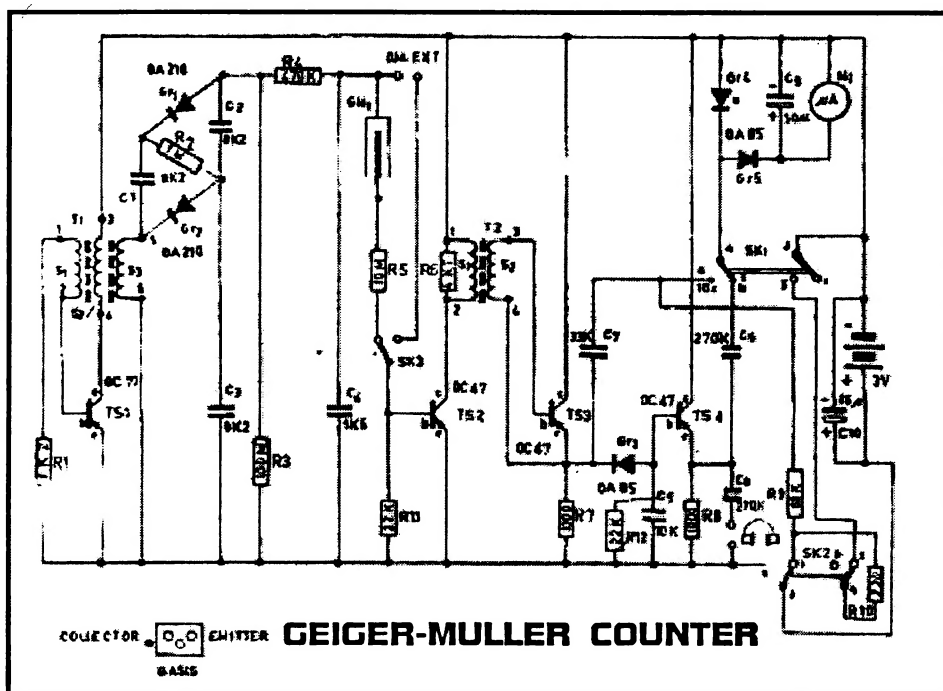
league was quite interested to know if his coffee was even faintly radioactive as the basis of a possible change to hopefully an uncontaminated substitute.

The answer to this enquiry was, of course, "Yes", subject to the caveat that some work was required to restore the Geiger Counter to its former sensitivity. Assuming that this was possible, checking out the food product would represent an interesting little exercise in prudent consumption.

A superficial inspection of the Geiger Counter suggested a relatively high degree of simplicity in design and construction but, initially, servicing the device was made far more difficult by the seeming absence of any documentation showing its wiring layout or components. After a number of telephone calls to Philips, and with the gratefully acknowledged assistance of the Service Man-

ager here in Sydney, a schematic was made available from the Melbourne arm of the firm and material faxed to the author.

As the diagram indicates, this is an extremely simple device. As discovered from the Philips material, the author's version made use of the



earliest generation of solid state devices, the Transistor. In the Philips Geiger counter the transistors are from the early Mullard series which included the OC 44, OC70 and so on: These are now almost historical objects in their own right.

Further inspection of the Geiger counter revealed that all of the high capacity capacitors used in the high voltage supply to the Geiger-Muller tubes, were of tubular non-polarised electrolytic construction. Suspicion could immediately be di-

rected at these devices but, given the small number of capacitors in any case, the decision was taken to replace all such devices with modern polycarbonate and polypropylene substitutes. As it turned out this decision was not that easy to put into effect because, over the years, high capacity, high voltage devices have been made largely obsolete with the proliferation of low voltage transistorized equipment. However, in the end, the combined forces of three Musketeers of the Amateur Electronic Industry, Dick Smith, Jaycar and Davred, were able to supply capacitors sufficiently close to the required value as to be considered satisfactory. It was then possible to sit down with a soldering iron and replace virtually all the existing capacitors in one hit, with the pleasant result that the Geiger counter sprang to life once more, and as soon as the Geiger-Muller tubes had the necessary 40 or more volts on their anodes. The success of the operation could be seen as the presence of background radiation was registered by the meter. The accompanying "click", which would occur at intervals of ten second or so, was another very pleasing record of the passage of Cosmic rays and a sign of the restored sensitivity of the counter.

With this success, thoughts turned to other sources of radiation in the home, merely as a means of testing the sensitivity of the newly restored Geiger counter.

Not so long ago there was an interesting programme provided by the ABC, concerning the sad history of workers at a Canadian factory, known as the Radium Clock Company. This firm had, soon after the First World War, set up a business to put self-illuminated figures on the faces of clocks and watches and had employed well over a hundred young women in this task.

The material which had been used for this exercise was a combination of Radium salts and Zinc compounds. In the presence of the radiation emitted by the Radium, the Zinc compound would glow brightly in the dark. At this time very little was known about the impact and long term implications of exposure to radiation from radioactive compounds and the health of the girls involved in this industry was later very seriously affected. Over a horrifying short period, very

many of them were to succumb to the awful impact of Radium. Many of the girls indulged in a particularly dreadful practise, to modern eyes: They would lick the tips of their paint brushes, with which the Radium and Zinc compound was applied, in order to achieve a sharp point so as to more accurately follow the figures on the dials they were working with.

This practise soon led the local dentists to diagnose a work related syndrome, which they came to describe as Radium Jaw. This seems to have been a particularly swift and destructive form of bone cancer. Very many, if not all, of the girls who had worked on the dials in the Radium Clock factory seemed to have been affected sooner or later by cancer in one part of the body or another. Unfortunately the connection between the work and the morbidity and mortality rates amongst these workers was not made by the Scientific community until years later. During the 1920's and 30's Radium continued to be used quite commonly as a means of making dials which would glow in the dark. The author was vaguely aware that this continued to be a common practise during the Second World War.

As it happened, some while ago the author had purchased at a second hand emporium on the Warringah Peninsula, a 1940's style military prismatic compass. This device had required a certain amount of maintenance work, including replenishment of the light oil used to damp the dial, known as Intava, which was supplied by the firm, Edwin Bowers. Needing a household object with a low level of radioactivity to provide the basis for a simple test, the military compass immediately suggested itself as a possible candidate.

The results of the test were to say the least disquieting. Expecting at the worst, a modest increase in the "click" count from the Geiger counter and as compared with the background level, bringing the probe of the device close to the compass produced a roar rather like an avalanche of stones on a tin roof. Dr. Strangelove would have been entranced, no doubt! The meter on the Geiger counter gave a reading of about 30 milliREM/ Hour when the probe was touching the face of the compass, although it was noted that as it was withdrawn, the count rate dropped with exponen-

tial suddenness. Suspecting that this represented a relatively "hot" device, and something requiring a degree of caution in handling, the compass was promptly consigned to a pewter (lead) cigar cylinder, resulting in a very comforting reduction in the count rate even when the probe was brought quite close to it (75 to 100 mm).

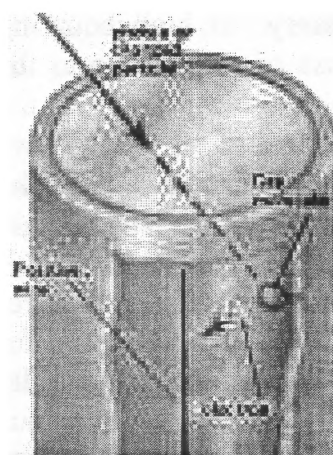
There it remains, together with another compass from the era of the First World War and an Ingersoll Triumph boys' watch of the 1950's. These latter devices have, since the initial test, been found to be quite significant radioactive sources as compared with the military prismatic compass. Based on information provided by Professor Laurie Peak of the University of Sydney and also from the Department of Health, they will probably continue to remain there in their lead sarcophagus for the foreseeable future.

This revelation of the existence of quite significant radioactive sources lurking in the home was rather like letting an evil Genie out of the brass bottle. It also prompted the thought that a similar situation might well be found in many homes around Australia. No doubt many devices from the period from 1900 to well after the Second World War, still lie in drawers and cupboards, quietly emitting their potentially dangerous and destructive radiation and all the while quite unsuspected by the householder.

OPERATION OF THE GEIGER COUNTER

The Geiger-Muller counter, usually abbreviated to the first name only, is really a very simple device. The main elements of the Geiger counter are the central anode wire and the surrounding partial vacuum contained in a jacket which forms the cathode connection. The voltage set up between the anode and the cathode can be around a thousand volts or more. As compared with other forms of radio activity detecting device, the main advantage of the Geiger counter is the very large gas amplification factors that are possible. This means that such counters are very sensitive, and also that the output pulses may be several volts in magnitude. This, in turn, means that external amplification may not be required in order for a voltage pulse to be recorded. The size of the voltage pulse is independent of the initial ionization produced

and so the same effect is produced in the counter by different types of radiation.



The action of the Geiger counter is as follows. The initial ionization produced by a particle entering into the detection region gives rise to an avalanche breakdown. This discharge is propagated along the whole length of the wire. It is possible for this discharge to initiate

a further series of discharges. Thus one discharge may give rise to a series of pulses at the output. To obtain reliable measurements it is necessary to quench the spurious discharges. There are two ways of doing this. One is to use an external quenching circuit, which reduces the applied potential to a value below the threshold potential of the counter after each pulse, and then restores it in readiness to record the next primary pulse. This is not very convenient and so methods of self-quenching have been developed.

Most counters used today are of the self-quenching type, a typical filling being argon with a very small proportion of ethyl alcohol as the quenching agent. After the primary discharge has been quenched, a positive space charge is left around the central wire anode. This reduces the electric field to below the threshold value, and hence the counter is now insensitive to any further ionization pulses. The space charge sheath then diffuses towards the cathode and the field recovers. The time taken for the recovery of the field to the threshold value is known as the "dead time" of the counter, because in this time no counts will be recorded. Even after the field has regained the threshold value, it still has to recover its full value. The time taken to do this is known as the recovery time. Although pulses will be recorded after the dead time has elapsed, they will be of a smaller magnitude until after the recovery time.

For the normal type of Geiger counter, the dead time is of the order 100 microseconds. This means that the Geiger counter is limited to count-

ing rates below about 104 counts per second. Even at counting rates far below this, some pulses will occur in the dead time, simply because of the random nature of the incident radiation. It is possible, and very necessary at high counting rates, to correct for the loss of counts due to the dead time.

The efficiency for the detection of alpha particles, beta particles and electrons is very high, approaching 100 per cent. The reason for this is that only one primary ionization electron is required to initiate the discharge. The efficiency for the detection of gamma rays or X-rays is usually very much lower (about 2 per cent) and is dependent upon the probability of an electron released by an interaction in the wall material reaching the sensitive region of the counter. This probability can be increased by the use of suitable wall materials and suitable geometry.

RECOMMENDED RADIATION EXPOSURE LEVELS

Having considered some of the possible sources of radiation that may be lurking around the house all unsuspected, and having described the Geiger counter as a means to their detection, it is only sensible to give a factual discussion of levels of radiation and limits that relevant authorities currently recommend as appropriate for anyone to receive on a short and long term basis. The source of information for this advice is, firstly, the International Atomic Energy Agency and secondly its agency in Australia, the Australian Nuclear Science and Technology Organization located at Menai in New South Wales. The Information Office of this latter organization makes available two pamphlets and a single sheet of information from which the most significant points have been extracted.

However before going to the recommendations and the numerical limits suggested for acceptable levels of radiation, a direct quotation from the ANSTO broadsheet helps to put the whole question of radiation levels into some sort of perspective. As this publication says:-

Radiation is all around us, all day, every day, it sustains our lives. We see because our eyes detect

and analyse the radiation we call light. Infra-red radiation keeps us warm, whether from the sun or from a glowing fire. We often cook with microwaves. Radio Waves allow us to communicate over huge distances by sound or picture. Ultra-violet radiation can be used for medical treatment or for acquiring a good suntan. All living things rely on some form of radiation for their existence. In the twentieth century we recognised another type of radiation: Ionising radiation, the subject of this pamphlet. Ionising radiation is all around us, all day, and gives rise to our natural background radiation dose. It comes from many sources, including outer space, the sun, the rocks and soil beneath our feet, the buildings we live in, the air we breathe, the food and drink we ingest, even our own bodies. Man has also enhanced his radiation dose by a variety activities. Two are dominant. The first is living indoors. In surrounding ourselves with bricks and mortar we increase the concentration of a radioactive gas called Radon in the air we breathe. Radon arises naturally from the radioactive decay of uranium and thorium, normally present in rocks, soil, bricks, mortar, tiles and concrete. Reducing ventilation in order to conserve energy increases Radon concentration still further. Using bore water, especially in a hot shower, also increases one's Radon dose.

The second is medical use, X-rays in radiography and tomography and radioactivity in nuclear medicine. Some therapeutic uses of radiation give you a dose to certain organs many times higher than your annual background radiation dose.

Small extra doses of radiation arise in a number of ways. The higher one goes, the less shielding the atmosphere affords from cosmic rays: On a mountain top the air may be cleaner but the radiation dose is higher. Air doses. Fallout affects us mainly through our food and drink. Many industries release otherwise locked-in radioactivity into the environment. This is especially true of coal-burning plant and to a lesser extent the fertiliser, mining and building industries.

Other common sources of radiation are some older luminescent clocks and watches, gunsights, compasses, exit signs, certain paints and pigments, dental porcelain, fire alarms, smoke detectors, television sets normal operations

of the nuclear power industry and the use of radionuclides in industry, agriculture and the environment. Their contribution to our radiation exposure is very small.

The broadsheet goes on to talk about units of radiation and as the recommendation as to dose level will be given in units which are generally unfamiliar to most people, a further quotation is appropriate:-

Ionising radiation is a form of energy travelling as electromagnetic waves (X-rays and Gamma rays) or as streams of particles (Alphas and Betas). They all transmit kinetic energy to materials they encounter. Faster rays deliver a harder punch. The measure of absorbed radiation dose is the Gray (Gy). The Gray replaces the old unit, the Rad. One Gray equals 100 Rads.

While the energy delivered by different particles may be the same, the effect on living cells can be quite different. Alpha particles and neutrons are approximately ten times as damaging as Beta particles and Gamma rays for the same amount of energy deposited. So the dose equivalent, the Sievert (Sv), is the important unit to assess the effects of ionising radiation on living cell, especially human beings. It does not measure the same thing as the Gray. The Sievert replaces the old unit, the REM, (the Roentgen Equivalent for Man). One Sievert equals 100 REM and so 1 millisieverts equals 100 millirem.

Note that the radiation dose you receive from radioactivity depends not only on the biological effectiveness of the radiation but also on the strength of the source, its distance

from you, the effect of any shielding and your exposure time.

The strength of a radioactive source is determined by the number of disintegrations of its radioactivity per second. The unit is the Becquerel Bq, one disintegration per second. This is a very low rate and it is common for radioactive sources to be quoted in kilobecquerels (KBq), megabecquerels MBq) or gigabecquerels (GBq). The Becquerel replaces the Curie. There are 37 million Becquerels to the Curie.

Radioactivity dispersed in another material may be expressed as, say, megabecquerels per kilogram (MBq/kg) for natural radioactivity of some rocks, or as Becquerels per cubic metre (Bq/m³) when describing the radioactive content of air. These units do not describe your radiation dose, they represent the strength of radioactivity at a given place.

With this preparatory information it is now possible to turn with rather more confidence to the specific recommendations and the numbers suggested as generally safe where exposure to radiation is likely to occur. Given that the background radiation to which everyone is exposed on an annual basis amounts to about 2 millisieverts (mSv) or 2000 microsieverts (uSv), then the annual doses suggested as an upper limit for workers in the Atomic Energy or Radiological area should not exceed 25 times background or 50,000 microsieverts (uSv) per annum. By comparison with this, the members of the public are suggested as having an annual limit of 1 /50th of this figure or 1000 microsieverts. For those more familiar with the older unit, the REM, this equates to 100 millirem per annum.

AVERAGE INDIVIDUAL RADIATION EXPOSURE FROM VARIOUS SOURCES	
SOURCE	EFFECTIVE DOSE EQUIVALENT / ANNUM
Cosmic radiation at sea level	0.30 mSv
Radon (222Rn and 220Rn from 238U and 232Th)	1.37 mSv
Potassium (40K)	0.30 mSv
Other	0.02 mSv

TOTAL	2.00 mSv millisievert

The prismatic compass previously referred to gives off radiation, according to the Geiger counter, at a level of about 40 millirem per hour, so one could classify it as quite a "hot" radioactive source and one to be cautious of in handling. This is clearly a device to put well away from people in the household and inside some shielding such as the Pewter pot described earlier. However the prudent last word on exposure to radiation is that the absolute minimum level achievable is probably the safe level to aim for. As is stated in one of the pamphlets, previously referred to:

There is still considerable uncertainty about the effects of exposure to radiation at low dose rates. This is because effects, if they exist at all, are masked by the "normal" occurrence of disorders which may or may not be due to radiation exposure.....it seems reasonable to assume that as the radiation dose becomes smaller, its effects become fewer.

WHAT TO DO WITH A SUSPECTED SOURCE OF RADIATION

In the event that this article spurs your curiosity and you realize that you have one of the many possible items described as having dials or other parts illuminated with Radium and Zinc compounds, there are a number of things that you may care to do. Firstly, whatever else, do not simply throw the suspect device away. It may not be radioactive in any case but, even if it is quite "hot", such a reaction does not solve the problem in any sort of a responsible way. It simply transfers it somewhere else, if not to someone else who may be quite unsuspecting and who does not necessarily have access to this magazine.

If you are concerned that you may have a really "hot" source, then it is possible to have the device examined by the officers of the Radiation Laboratory who come under the Department of Health in New South Wales. No doubt similar organizations exist in all States and would be similarly concerned and helpful.

With low level sources of radiation, the best defence is distance. That is to say, the further that you are from the radioactive source the better for your long term health, particularly if such distance is assisted by a substantial layer of lead around the source of radiation.

Apart from direct exposure to radiation and in particular the impact of the potent and highly penetrating gamma radiation, it is as well to realize that alpha and beta rays can become dangerous if they are emitted in close proximity to the tissues of the body. While this is unlikely to happen under normal circumstances, if particles of the radioactive material are ingested through the mouth or through breathing them in, they could cause very severe long term health risks.

So another important rule when dealing with Radium compounds or any other source of radioactivity, is to avoid touching the material possible afterwards, thoroughly wash your hands to remove any minute particles which may have dusted off the surface of the solid material. Even quite minute particles, when they are in direct contact with the body, can be very dangerous.

Some comments on the appearance of Radium and Zinc compounds may also be useful. This may help to determine probable suspect sources of radioactivity, as compared with other non-troublesome materials. Modern luminescent paint

READERS!!

This is your magazine. We need your contributions. Share with others your successes and failures. If you write it down when it happens, you will know what to do next time.

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is usually a very bright green or blue-green colour and, in bright sunlight, will look almost as fluorescent as a felt pen marker ink on paper. Such material does not hold its luminosity for very long in the dark and this is the best initial test. By comparison, Radium doped Zinc salts give off a glow in the blackest of nights and are a dull sandstone or greyish coloured material and do not look at all luminescent in normal light.

Finally a word about that Polish coffee that started off this whole saga. After the dramatic response to the magnetic compass, it was quite an anti-climax when the elderly Geiger counter did not increase its "click" count in the slightest when exposed to the coffee. However this is not surprising based on more recently received information from the Radiation Laboratory of the Department of Health. They said that the Geiger counter was far too insensitive to pick up the level of radioactivity that might be associated with such a source. However their testing had not revealed any significant increase in the count rate from imported

food since the Chernobyl disaster. This should be quite a comfort to lovers of Polish processed coffee and perhaps also for those who would like to purchase those Balkan jams which seem to be so inexpensive, relative to the locally produced variety.

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A VICIOUS SPYWARE ATTACK

by

Peter R Jensen

As I have mentioned at meetings, I have a single machine that deals with all e-mail and internet searching which is disconnected from the other machines in the office. Given this most recent experience, I intend to continue with that arrangement and as far as possible avoid any contact between other Business Machines and the potential source of problem in the internet.

Contrary to that operational decision, a few weeks ago I connected up the XP machine on which we keep our accounts, to the internet in order to download some information from one of the suppliers, Quicken. What a disaster! I had not realised quite how virulent the Blaster worm was and of course, had not installed the latest patches for XP designed to repel it. McAfee provided software to dislodge that particular virus but as the support site revealed, removing this plague element completely is very difficult because it disguises itself inside the operating system making it difficult to dislodge. However the symptoms were obvious. The machine ran very slowly and made the operator very unhappy. Net result - 10 hours to re-

intalled XP and all the software that was on that machine together with downloading the relevant patches and installing them. The patches represented far the longest element in the re-install because for this machine, we were using the dial-up ISP to transfer the 20 megabytes of data.

Next step for that machine is to install a tray mounted hard drive so that a full system back-up is possible with least pain. That is what I have done with my older Win 98 SE machine and it is very comforting to be able to pull-out a full back-up and store it separately if we are away from the house for any length of time. That is evidently the moral of this part of the story: having a back-up system is now essential as opposed to being potentially useful, given the vicious nature of the internet and the time wasting impacts that it can have.

If the sad story of the XP machine were not enough to make the point about backing up, then a further experience with the machine that is used for e-mail and internet searching is a salutary if depressing reminder

that backing up and virus protection are essential components of the computing experience these days.

About two weeks ago, I was searching around on the internet for a second-hand version of Photoshop V5, given the exorbitant cost of Photoshop V8. Ultimately, I found a possible source as some site that should be nameless and opened it from the Google search prompt. Perhaps I should have been warned that it was an unsafe place to be by the quality of the graphics and content which were frankly sleazy. These days, the internet is a very dangerous jungle in which to roam and anything that looks slightly suspicious is probably best to be avoided. Unbeknown to me, that wretched site deposited a nasty little Trojan on my system that has taken considerable time and effort to remove.

The Trojan appeared to be a spyware artefact called N-Case and its effect was to "hijack" my Explorer home page so that it could not be changed to "blank" where it usually starts. Instead it would take me off to a research facility called Get-search, which in turn would almost immediately take me off to a site that was the portal for a poker school facility where I was invited to gamble.

After a lot of messing around using Google as the search facility, I discovered that Spy Sweeper had a programme available to remove the N-Case Trojan and this was duly run. This is available inside an article at www.spysweeper.com/n-case-removal.html and the programme found a whole heap of spyware elements lurking on my e-mail machine. However it did not get rid of everything as Get-Search kept popping up, even though I would reset the home page to blank through *tools, preferences* in Explorer. Evidently something was still sitting in the registry invoking this particular annoyance.

Ultimately, following more Google based searching, I found the advice and software of Mike Healan. His programme, HijackThis allowed me to see what was running in the background and a couple of suspicious elements in the registry that looked likely culprits. For similar assistance, you can go to www.spywareinfo.com/articles/hijacked/prevent.php

However before running this particular programme, it is essential to back up your Registry before making any changes. In the Registry, there is no facility to undo a change if you get cold feet. More importantly, it is possible to completely upset the operating system and stop your machine from working by incorrectly changing the contents of the registry: so, be warned. The relevant instructions at a Microsoft can be accessed through their side <http://support.microsoft.com/> by searching for Knowledge Base article 256419. However what is required is relatively simple and involves the following three steps.

1. Click **Start**, click **Run**, type **scanregw**, and then click **OK**
2. When you receive a prompt to back up the Registry, click **OK**
3. When you receive the "Backup complete" message, click **OK**.

Even though these instructions are simple, reading the Microsoft article is probably prudent.

Once the Registry is suitably backed up, it is possible to activate the HijackThis programme and go in and **FIX** the offending Registry items. This appears to involve eliminating the relevant entries but the **FIX** command also seemed to replace the bits that the Spyware had changed. Following that, everything seemed to revert to normal.

However, that is not quite the end of the story. Following a reading of the article by Mike Healan on avoiding spyware, I installed Mozilla as my browser to replace the use of Internet Explorer. The security of this Mozilla browser is much better than IE and hopefully I will not need to go excavating for any more spyware for the time being. However, the Internet is a cruel place these days and the maniacs that frequent it are ever more inventive so I will expect the worst. However, the Internet machine is about to get the back up hard drive that I have been promising myself to install for some time – **Backup, backup, backup**. Not just an ambition but essential so think about it and act now rather than emulate the sad story of your editor.

MEMBERS...!

**DON'T SUFFER IN SILENCE
- SHARE YOUR DISASTERS**

WRITE TO MICROCOM

**DON'T HIDE YOUR DISCOVERIES
- SHARE YOUR SUCCESSES**

HUNTING PARTICLES WITH A LAPTOP

By J Innes VK2AUI

A laptop computer makes an ideal interface for extending the usefulness of almost any information gathering device, partly because of its ability to record, and partly because of its ability with the right software to make sense of what it gathers. When I read an advertisement in Scientific American for a Geiger counter, the possibilities were so exciting that I couldn't send away for one fast enough. The product line is made by Aware Electronics Corporation of Wilmington, Delaware (www.aw-el.com), and includes counters with a choice of three different sizes of Geiger tube and software and accessories.

I ordered the mid-sized sensor, which was much more sensitive than the unit with the small tube, and less expensive than the large one. The case of the unit is about the size of a small packet of cigarettes, and connects with a four wire telephone cable to a DB-9 or DB-25 connector (both sizes provided) for the serial port of the laptop, which supplies it with power. The basic software provided runs a display of count rate versus time, and produces the expected clicks from the laptop's beeper. It also allows setting an alarm to sound when a chosen count rate is exceeded. After the program has run long enough to establish the background radiation level, even very small increases in level can be detected and recorded. The counter will respond to alpha, beta and gamma particles, and its window is blackened with carbon to prevent it responding to ultra-violet light. By using an alpha source, it is easy to show that these particles can be stopped by a sheet of paper. A strong alpha source can be found in a cheap smoke detector, which will probably use the Americium 241 isotope. You will probably need to remove a metal cover from the source, which can be done safely; but do not try to remove the source itself, as any small chip or dust from it could be inhaled, and the lung is not a good place to keep an alpha source. A good beta source is a gas lamp mantle, as these generally use salts of thorium. Get the ones made in India, because the Coleman mantles made in USA have stopped using thorium.

Many things found in the home will be found to raise the level of radiation above the general background. Some examples are older luminous watch, clock and instrument faces, brickwork, earthenware and ceramics, particularly coffee mugs made in China, some glassware, mineral spring water and some tinned fish. Brick buildings have a higher background radiation level than timber ones, and one of the hottest spots in the CBD is the steps of the old GPO in Martin Place, because the

Moruya granite has traces of uranium in it. It is easy to demonstrate the increased background radiation level as you rise above sea level, and the software will draw a nice altitude plot if you take it on a long car or plane trip.

Software available at extra cost can make a graph of the radiation from a radioactive sample over time, and determine the half life of the source of radiation, allowing it to be identified. One application of this is to detect the presence of radon gas, which occurs naturally in the earth and can build up in a cellar that has poor ventilation. The technique is to use a Dustbuster to draw air through a paper coffee filter, then put the paper on the window of the counter. The daughter products of the disintegration of radon can be identified by their half life, and the comparative concentration of radon estimated by repeating the exercise on a sample taken in the open air.

It is also interesting to analyse the fine dust in the house, taking the sample from your electrostatic precipitator. You didn't think you had one? Wipe a damp swab across the screen of your TV set or your computer monitor (assuming you haven't gone LCD yet), and identify the radioactive constituents of the dust from their half lives.

Speaking of half lives, there is a story about some weeds growing along the side of an expressway which, when checked for age by radiocarbon dating, indicated an age of many thousands of years. They had grown, as plants do, by absorbing carbon dioxide from the atmosphere, and the carbon dioxide in their atmosphere came from the exhausts of the passing cars, all burning fossil fuels derived from plant life grown in prehistoric times.

The counter can be used to detect neutrons indirectly, using a piece of silver foil over the window. Neutrons, if they have a high enough energy, will cause the emission of gamma particles from the silver foil, and the counter can detect the gamma particles.

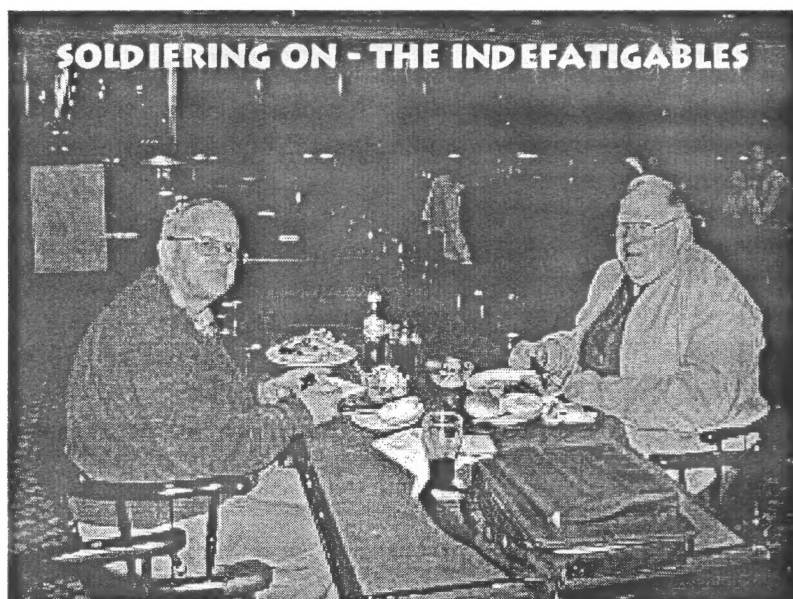
A friend of mine had an MRI scan done, and out of curiosity used his counter to see if he was still "hot". He was horrified to find out that he was so hot from the technetium marker used for the scan that he got an upscale reading from his toilet when he had used it. For a few days he was drinking copious quantities of water and beer in an attempt to flush it out of his system. I heard of one man who was so "hot" after a scan that when he drove home from the hospital, he set off the

radon monitor in his cellar as soon as he drove into his carport.

The counter can also detect muons, which are generated about 20 km above earth when cosmic rays hit the atmosphere. Muons have a life of about two microseconds. How, I hear you ask, can they reach us, as even light takes about 67 microseconds to travel 20 km? The answer is that the muons travel at about 80% of the speed of light, and due to the time dilation effect of relativity, the trip seems to the muon to take less than two microseconds. To distinguish the muons from the background radiation, you need two sensors coupled to the laptop using a coincidence gate. The gate puts out a pulse only when a particle passes through both sen-

sors, so this rig also serves to determine which direction the muons are arriving from. The muon flux varies from location to location, and has been studied to try to explain the different failure rates of computer chips in different places. Muons generally constitute about 5% of background radiation, hence the need for the "muon telescope" using two sensors to pick them out of the noise.

So for the curious experimenter, the Geiger counter will reveal a lot about your world. Some of it will let you live a safer life. Some of it you may prefer not to know. We live in an endlessly interesting world.



SOLDIERING ON - THE INDEFATIGABLES

ACCA MEETINGS

MEETINGS ARE HELD AT THE KIRIBILLI SERVICES CLUB, LOCATED AT CLIFF STREET, MILSONS POINT AND COMMENCE AT 7.30 PM THE CLUB SERVES A RANGE OF MEALS AND A NUMBER OF MEMBERS MEET AT 6.30 PM FOR DINNER

MEETINGS WILL BE HELD ON THE FOLLOWING DATES OVER THE NEXT FEW MONTHS

16 August 20 September (AGM)
18 October

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